

A close-up photograph of a single, vibrant green leaf with numerous water droplets on its surface. The leaf is positioned on a dark, wet, reflective surface, likely asphalt or pavement, which creates a clear reflection of the leaf and the light source above. The background is blurred, showing a bright light source, possibly the sun, creating a lens flare effect. The entire image is framed by a dark blue background with a light green curved border on the left and bottom.

# **Environmental Pollution and inflammatory response in humans/ animals**

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# Introduction

- Environmental pollution is defined as “the contamination of the physical and biological components of the earth/atmosphere system to such an extent that normal environmental processes are adversely affected.
- The most evident form of air pollution is a dark layer of gas – also known as smog – present above big cities.





# Pollutants classification

- Environment pollutants can be found in different forms and sizes. They can be solid particles, liquid molecules or gases.
- According to the way they are generated these pollutants can be considered as primary (directly produced) or secondary (formed by the interaction of primary pollutants).
- In addition, there are indoor and outdoor pollutants, all of which can be detrimental to human health.
- Although indoor pollution is generally low, its levels can be augmented by the use of several chemical products (e.g. cleaning products, paints), heaters, stoves and indoor smoking.

# Air pollution affects people throughout their lifetime



## Pregnancy

low birth weight



## Children

asthma  
slower development of lung function  
development problems  
more wheezing and coughs  
start of atherosclerosis



## Adults

asthma  
coronary heart disease  
stroke  
lung cancer  
chronic obstructive pulmonary disease (as chronic bronchitis)  
diabetes



## Elderly

asthma  
accelerated decline lung function  
lung cancer  
diabetes  
dementia  
heart attack, heart failure and strokes



# Environmental Pollution and Inflammation

- Air pollution may rank as the most prevalent source of inflammation and oxidative stress.
- Elevated levels of environmental pollution are associated with an increased risk of respiratory diseases, chronic obstructive lung diseases (COPD), cancers, cerebrovascular-strokes, cardiovascular diseases and mortality.





# Environmental Pollution and Inflammation

- Oxidant air pollutants such as ozone, particulate matter and nitrogen dioxide have been shown to induce lung inflammation through stimulation of the oxidative stress process.
- Some studies found that environment pollution is associated with activation of inflammatory/oxidative stress pathways, and increase in plasma viscosity (Pope et al., 2004).

# Outdoor Pollution Effects

## Harms from High Pollution



Slower development of lung function



Asthma



Start of atherosclerosis



Child

In Womb



## Harms from High Pollution



Smaller head



Lower birth weight at term



Older Person

## Harms from High Pollution



Accelerated decline in lung function



Accelerated decline Asthma



Type 2 diabetes



Poor cognition



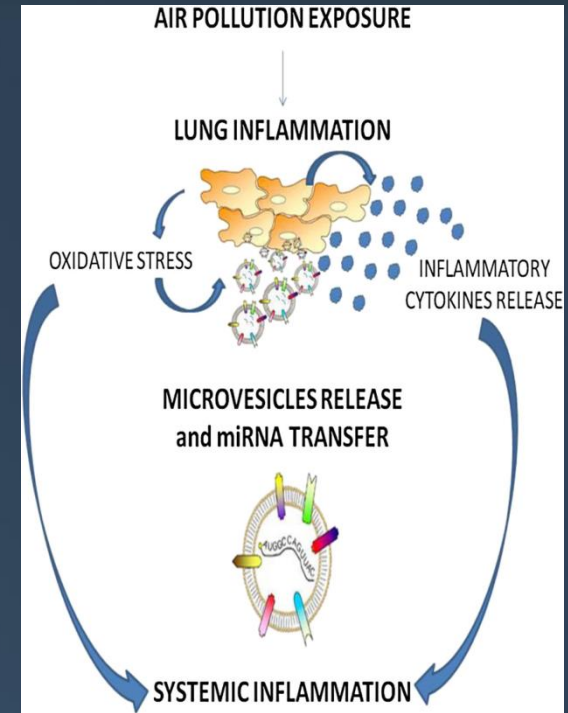
Heart attacks, heart failure & strokes



Lung cancer

# How environmental pollution cause inflammation

- Air pollution also causes inflammation damaging effects on the epithelial cell lining. leading to other issues such as pulmonary oedema, coagulation of blood, and cell death in lung tissue.







# Environmental Pollution and Inflammation

- Also, Exposure to air pollutants throughout childhood is associated with an increased risk of developing pediatric inflammatory bowel disease (Elten et al., 2019).
- WHO found an association between environment pollution, as well as to tumor development via oxidative stress and persistent inflammation (WHO, 2015).



# Environmental Pollution and Inflammation

- According to Choe et al. (2019), high concentrations of Particulate Matter is associated with placental inflammation and decreased placental angiogenesis, impacting fetal development.



# Effects on humans

- Breathing polluted air causes asthma and other respiratory diseases.
- When exposed to ground ozone for 6 to 7 hours, scientific evidence show that healthy people's lung function decreases and they suffered from respiratory inflammation.
- Air pollutants are mostly carcinogens and living in a polluted area can put people at risk of Cancer.
- Coughing and wheezing are common symptoms for breathing in polluted air.



# Pollution Effects on humans

- Environmental pollution damages the immune system, endocrine and reproductive systems.
- High levels of particle pollution have been associated with higher incidents of heart problems.
- The burning of fossil fuels and the release of carbon dioxide in the atmosphere are causing the Earth to become warmer, causing more floods, hurricanes.
- The toxic chemicals released into the air settle into plants and water sources. Animals eat the contaminated plants and drink the water. The poison then travels up the food chain – to people.



# Water Pollution Effects on humans

- Contaminated water may cause diseases such as amoebiasis, typhoid.
- Water polluted by chemicals such as heavy metals, lead, pesticides and hydrocarbon can cause hormonal and reproductive problems, damage to the nervous system, liver and kidney damage and cancer.
- Being exposed to mercury causes Parkinson's disease, Alzheimer's, heart disease and death.
- A polluted beach causes rashes, hepatitis, gastroenteritis, diarrhea, encephalitis, stomach aches and vomiting.
- Water pollution affects marine life which is one of our food sources.





# Pollutions Effects On Animals

Studies have found adverse effects for environmental pollution on dogs. A study in Mexico City, a city with high levels of air pollution, compared dogs living in the city with dogs living in an unpolluted area. They found that dogs in the polluted areas had inflamed brains and other signs indicative of disease (Calderón-Garcidueñas, 2008).



# Pollutions Effects On Animals

- A study found that environmental pollution Effects on animals included respiratory illness, affected immune systems, changes in behaviour and less success in laying eggs (Sanderfoot, 2017).
- A study in Sao Paolo, Brazil, (another city with high levels of air pollution) placed mice outside in cages for 4 months. One cage with filtered clean air and the other with unfiltered polluted air. The study found that when exposed to the unfiltered air from an early age, the reproduction fertility of the females went down (Mohallem et al., 2005).

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